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Effects of dried distillers grains and conjugated linoleic acid on gene expression for key enzymes in fatty acid synthesis.

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Feeding distillers dried grains with solubles (DDGS) to swine may adversely affect carcass fat quality. Commercial gilts were fed DDGS at 0, 20, or 40 percent of total ration during the last 30 days of the finisher phase. Beginning ten days prior to slaughter, one-half of each DDGS group received either 1% conjugated linoleic acid (CLA) or 1% choice white grease. At slaughter, liver was collected for RNA isolation and backfat was collected for fatty acid and mRNA analysis. Abundance of fatty acid synthase (FAS), carnitine palmitoyl transferase I (CPT-I), acetyl-CoA-carboxylase (ACC), stearoyl-CoA desaturase (SCD1), and glycerol-3-phosphate dehydrogenase (GAPDH) mRNAs were determined using Quantitative Real-Time PCR. Abundances of mRNA for lipogenic genes were normalized to GAPDH expression within each sample. Abundance of FAS, CPT-I, ACC and SCD1 mRNAs in adipose and liver samples were not different ($P > 0.05$) for DDGS and control pigs. The addition of CLA to the diets did not alter ($P > 0.05$) FAS or CPT-I but tended to decrease abundance of ACC ($P = 0.10$) and SCD1 ($P < 0.15$) mRNA levels in adipose tissue. The ratio of saturated to unsaturated fatty acids was decreased ($P < 0.05$) with DDGS (0.64, 0.57, and 0.54 ± 0.01 for 0, 20, and 40% DDGS respectively) and was increased from 0.56 to 0.61 ± 0.01 with CLA. Feeding DDGS decreased pork quality as determined by decreased ratios of saturated:unsaturated fatty acids. There was no interaction effect ($P > 0.05$) for DDGS and CLA on any of the transcripts measured or measures of pork quality. These data indicate that the effects of DDGS to reduce pork quality are not linked to changes in lipogenic gene expression. Feeding CLA leads to increased pork quality through alterations in SCD1 to increase the ratio of saturated to unsaturated fatty acids. Furthermore, DDGS and CLA appear to act in opposing directions on pork quality yet only CLA impacts lipogenic gene expression in adipose tissue.

Key Words: Distillers Grains, Conjugated Linoleic Acid, Gene Expression